# FM / TV front end

## BA4425F

The BA4425F is a monolithic IC designed for FM front end use. It consists of an RF amplifier circuit, mixer circuit, oscillation circuit, and IF buffer amplifier.

●Applications

FM radios
Radio cassette players
Home stereos
Headphone stereos

●Features

1) Uses double balance mixer to improve intermodulation characteristics.
2) Includes a clamp diode in the mixer output.
3) Local oscillation buffer on-chip for improved response to strong input.
4) The output impedance of the IF buffer is matched with the ceramic filter impedance at 330Ω.
5) Mixer input coupling capacitor included on-chip.
6) Includes a feedback capacitor for the local oscillation circuit.
7) Reception of VHF terrestrial TV channels is possible.
8) Compact SOP 8-pin package.

●Absolute maximum ratings (Ta = 25°C)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage | Vcc | 7.0 | V |
| Power dissipation* | Pd | 500* | mW |
| Operating temperature | Topr | −25～+75 | ℃ |
| Storage temperature | Tstg | −55～+125 | ℃ |

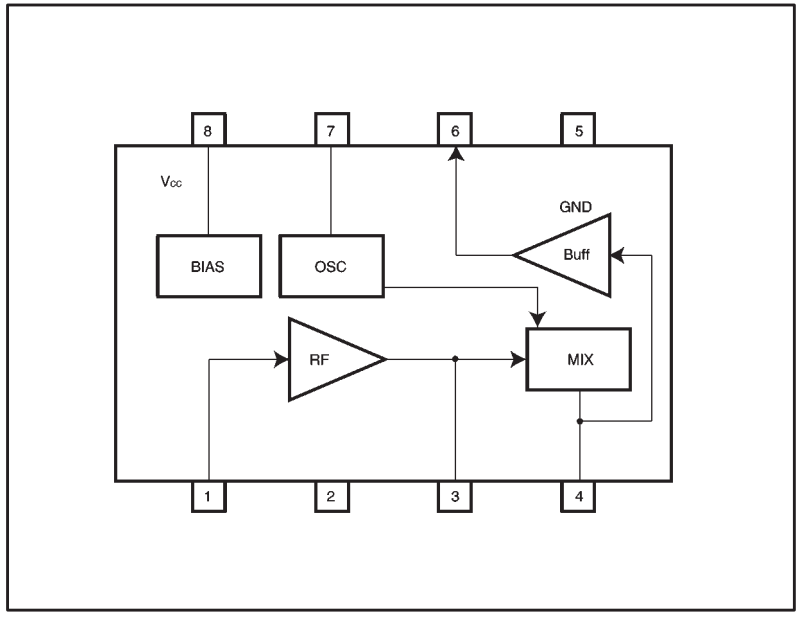
* Reduced by 5.0mW for each increase in Ta of 1℃ over 25℃.

●Recommended operating conditions (Ta = 25°C)

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Power supply voltage* | Vcc | 1.6～6.0 | V |

* For basic operation at Ta = 25℃.

●Block diagram



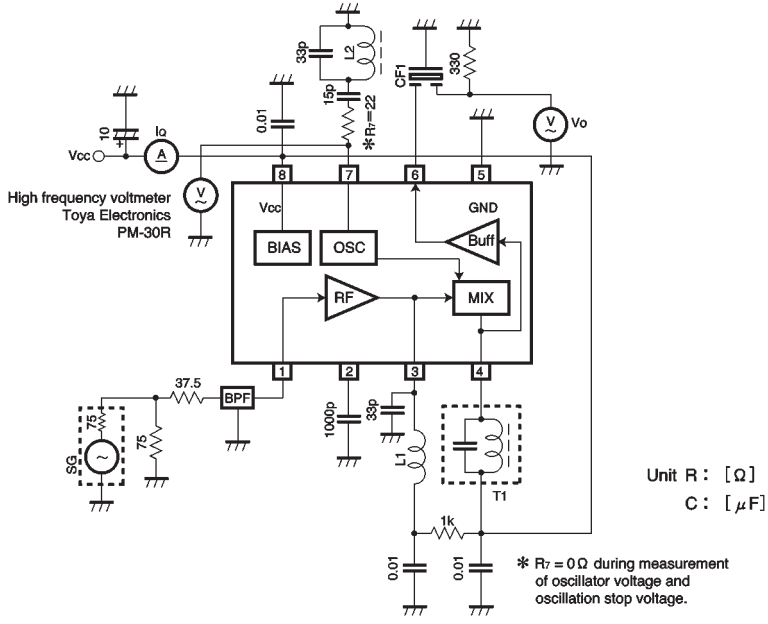

●Pin descriptions

| Pin No. | Pin name | Function |
|---|---|---|
| 1 | FM antenna input pin | Connect to BPF, etc. $Z_{IN}$ =75Ω |
| 2 | RF amplifier bypass pin | Connect to bypass capacitor |
| 3 | RF amplifier output load pin | Connect to RF tuning circuit |
| 4 | MIX output pin | Connect to IFT or resistor load |
| 5 | GND pin | Ground pin of IC |
| 6 | IF buffer output pin | $Z_{OUT}$ =330Ω |
| 7 | OSC pin | Connect to station resonance circuit |
| 8 | $V_{CC}$ pin | Voltage supply pin of IC |

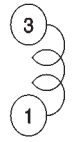
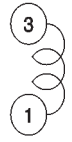
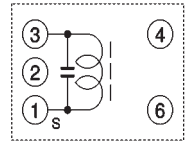
●Electrical characteristics (unless otherwise noted, Ta = 25°C and $V_{CC}$ = 4.0V)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions | Measurement circuit |
|---|---|---|---|---|---|---|---|
| Quiescent current | $I_Q$ | 2.6 | 4.5 | 7.2 | mA | No input | Fig.1 |
| Output saturation voltage | $V_O$ | 30 | 50 | 72 | $mV_{rms}$ | fd=98MHz, 80dBμV | Fig.1 |
| Local oscillator voltage | $V_{OSC}$ | 200 | 400 | 630 | $mV_{rms}$ | $f_{OSC}$=108MHz, $R_7$=0Ω | Fig.1 |
| Voltage conversion gain | $G_{VC}$ | 31 | 36 | 42 | dB | fd=98MHz, 55dBμV | Fig.1 |
| Local oscillation stop voltage | $V_{STOP}$ | — | 0.9 | 1.2 | V | $R_7$=0Ω | Fig.1 |

●Measurement circuit



●Component data

| Component number | Component name | Product number / manufacturer | Remarks |
|---|---|---|---|
| Z1 | Band-pass filter | BPMB6A<br>Soshin | 88～108MHz<br>Zin=75Ω, Zout=75Ω |
| L1 | RF coil | FEM10C−2F6<br>Sumida |  <br>①−③ $2\frac{1}{2}$T<br>Wire type: φ0.6UEW<br>No load: Q = 115 |
| L2 | OSC coil | FEM10C−2F6<br>Sumida |  <br>①−③ $2\frac{1}{2}$T<br>Wire type: φ0.6UEW<br>No load: Q = 115 |
| T1 | IFT | 2158−4095−498<br>Sumida |  <br>①−③ 13T<br>Wire type: φ0.10UEW<br>Tuning frequency: 10.7 MHz ± 3% or higher, variable<br>No load: Q = 70 or higher (10.7 MHz)<br>Tuning capacitance: 82pF±10% |
| CF1 | FM ceramic filter | SFE10.7MA5−A<br>Murata | 3 dB bandwidth = 280 kHz ± 50 kHz |

●Electrical characteristic curves

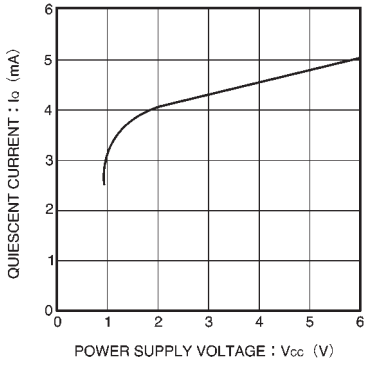



Fig. 1 Quiescent current vs. power supply voltage

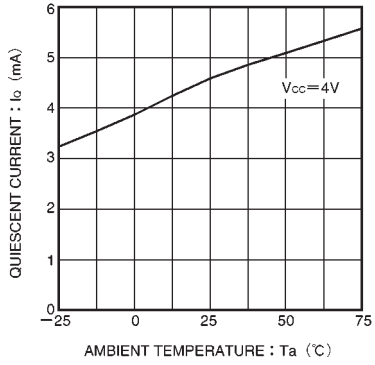



Fig. 2 Quiescent current vs. ambient temperature

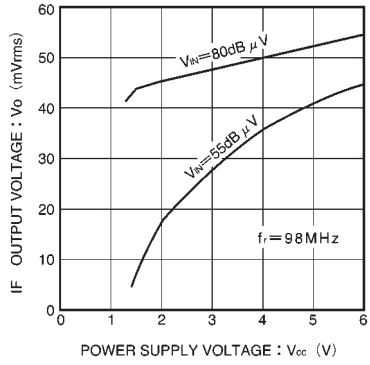



Fig. 3 IF output voltage vs. power supply voltage

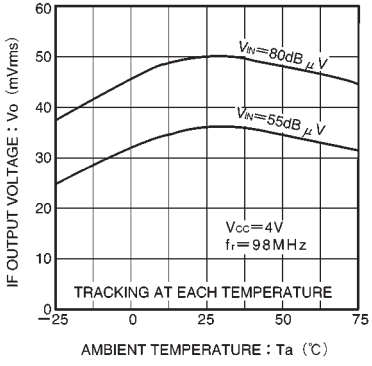



Fig. 4 IF output voltage vs. ambient temperature

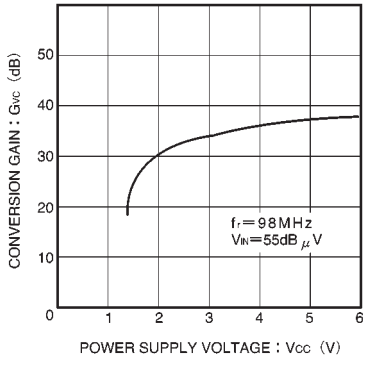



Fig. 5 Voltage conversion gain vs. power supply voltage

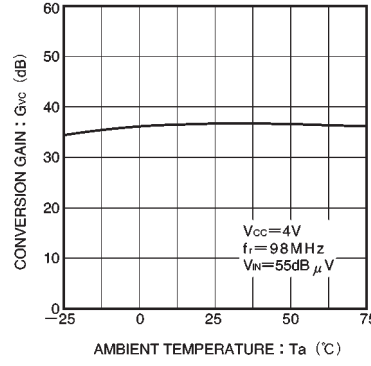



Fig. 6 Voltage conversion gain vs. ambient temperature

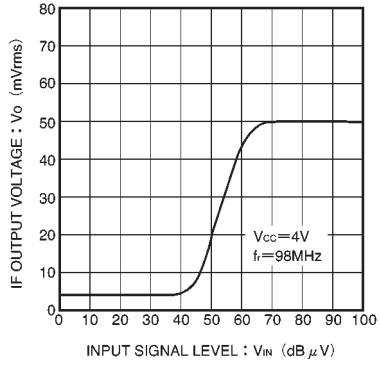



Fig. 7 IF output voltage vs. input signal level

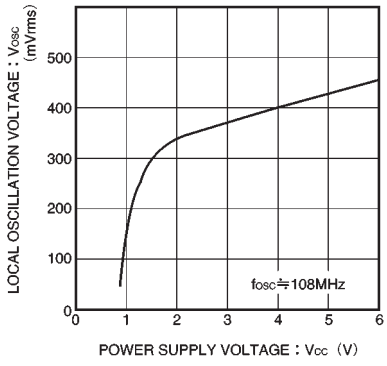



Fig. 8 Local oscillation voltage vs. power supply voltage

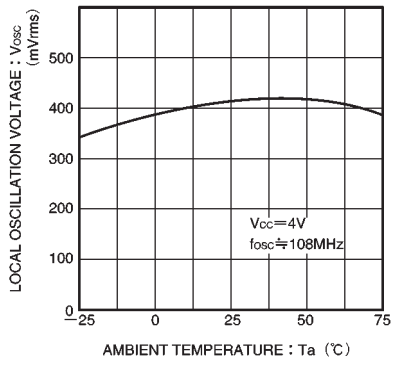



Fig. 9 Local oscillation voltage vs. ambient temperature

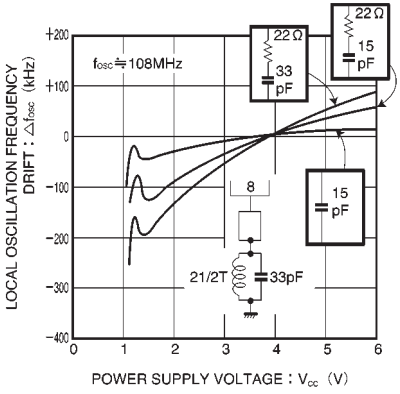



Fig. 10 Local oscillation frequency vs. power supply voltage

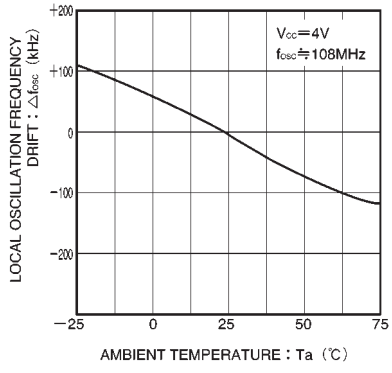



Fig. 11 Local oscillation frequency vs. ambient temperature

●External dimensions (Units: mm)